[EJ] Evening Poster | S (Solid Earth Sciences) | S-TT Technology & Techniques

[S-TT49]Airborne surveys and monitoring of the Earth

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Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Airborne surveys are useful to better understand the whole and/or the detailed structures of the Earth and their variations. They can be implemented from a traditional manned and newly-developed unmanned aircraft to efficiently map very large or remote areas with difficult access. We invite studies on theory, instrumentation, processing, modeling or inversion and applications of airborne surveys.

[STT49-P11]Relationships between power spectrum of each component of gravity gradient tensor and subsurface structure

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Keywords:Gravity gradient tensor, Power spectrum, Pseud depth

We derived equations giving relationship between the pseud depth of a subsurface layer and the power spectrum of each component of the gravity gradient tensor.

In recent decades, the six components of the gravity gradient tensor have been observed by gravity gradiometry, and techniques for estimating subsurface structures and for extracting the structure boundary (edge) using these data have been studied and developed. In general, filtering plays an important role in these analyses. In the case of a gravity anomaly, the well-known relationship between the power spectrum and the pseud depth of a subsurface layer plays an important role in filtering. However, most of these studies using gravity gradient tensor data have not conducted filtering to extract the specified wavelength from the gravity gradient tensors for subsurface estimations. One reason for this omission might be that the wavelength characteristics differ among the components of a gravity gradient tensor. And, such relationships for gravity gradient tensors have not been shown thus far. Therefore, in this study, we derived relationships between the pseud depth of the subsurface layer and the power spectrum of the components of the tensor.

These relationships were derived from the relationship between gravity anomaly and its causative subsurface layer through the relationships between gravity anomaly and each component of the tensor in Fourier domain (e.g., Mickus and Hinojosa, 2001). In the deriving these relationships. It was assumed that the amplitude of the subsurface structure would be small enough than the average depth of the structure. As a result, it was found that all derived relationships were nonlinear to the wave number on a semi-logarithmic scale and that that, except for g_{zz} component, all spectra are not point symmetric with respect to the origin but has direction dependency.

[Acknowledgements]

This work was supported partially by JSPS (Japan Society for the Promotion of Science) KAKENHI Grant Number 17K01325. The author is grateful to the agency.

[References]

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